Before the
Federal Communications Commission
Washington, D. C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules to	)	ET Docket No. 96-102/FCC 96-193
Provide for Unlicensed NII/SUPERNet	)	RM-8648
Operations in the 5 GHz Frequency Range	)	RM-8653

To: Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Washington D.C. 20554

Comments of

The San Bernardino Microwave Society

In Response to FCC ET Docket No. 96-102/FCC 96-193

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July 11, 1996

Comments of

The San Bernardino Microwave Society

In Response to FCC ET Docket No. 96-102/FCC 96-193

By the Membership:

Statement in Opposition to:
Federal Communications Commission
Notice of Proposed Rule Making 96-193

1. The San Bernardino Microwave Society is opposed to proposed amendments of the Federal Communications Commission rules, specifically changes to part 15, which would allow a new unlicensed radio service to share spectrum with the Amateur service in the 5 GHz range. We are opposed to these proposed rule changes for the following reasons:

a) Proposed rule changes would eliminate long established protection of incumbent Amateur users of affected portions of the 5 GHz Amateur band.

b) Over time, the proposed rules would render a substantial portion of the Amateur 5 GHz band unusable in most geographic areas.

c) There are no alternative avenues presented as to how incumbent Amateur users of the affected 5 GHz band will be protected from interference caused by the proposed new service.

d) The proposed new rule section 15.409 appears to be in conflict with the universally recognized interference protection of current rule section 15.5 (b).

Introduction

2. The San Bernardino Microwave Society (Society) is a non-profit organization "dedicated to the advancement of communications above 1 GHz". Our membership primarily consists of college-educated professionals employed in the high-tek electronics

and defense industries. The Society was formed forty-two years ago as a vehicle for sharing of technical information relating to microwaves and to promote activity within the Amateur radio service on the microwave bands. As members of the Amateur radio community, we are dedicated to upholding the long tradition of technical advancement and unselfish community service entrusted to us through the establishment of the Amateur service.

3. The above referenced docket affects spectrum within the Amateur 5 cm allocation. Radio Amateurs were given an allocation in the 5 cm region in 1945. Members of the Society have been active on the 5 cm band since the Society was first formed in April of 1955, and our founding members had been active on the band starting in the late 1940s. Our current membership is made up of Amateurs who are active in all facets of microwave communications, including a variety of uses of the 5 cm band.

4. In May of 1995, two petitions for rule making were filed with the Federal Communications Commission (Commission), both asking for an unlicensed "NII/SUPERNet" service to be created in the 5 GHz range. One of these two proposals, specifically the one filed by Apple Computer, asked for an allocation of 150 MHz ranging from 5.725 to 5.875 GHz (to be used in conjunction with an allocation at 5.15 to 5.3 GHz). The requested unlicensed NII/SUPERNet use of the spectrum running from 5.725 to 5.875 GHz, referred to as the "upper band segment", is what this filing is directly concerned with.

5. The current Amateur 5 cm allocation, as specified in part 97 of the Commission's rules, runs from 5,650 to 5,925 GHz. Since the Apple Computer petition requests a new unlicensed allocation concurrent and concentric to the Amateur allocation, we are directly concerned with the reduction in communications capability which will be caused by interference from the proposed new service. The Commission has asked for comments regarding the effects of this proposed new service, and we therefore are compelled to file our comments.

Discussion

6. In its Notice of Proposed Rule Making[1], the Commission states at 34:

> *"While we recognize that the proposals present some difficulties which need to be resolved in this proceeding, such as spectrum sharing between incumbents and new users and the propagation of 5 GHz signals within buildings, we believe that the 5 GHz range is the appropriate spectrum for the proposed operation."*

[1] FCC NPRM 96-193, ET Docket 96-102

7. Through this summation, the Commission restates their concerns over the feasibility of spectrum sharing. From our perspective, this statement echoes the primary concern of the Amateur community; To date, there have not been any technically-based proposals forthcoming from proponents of the proposed new service regarding how spectrum will be shared, and perhaps of more importance to the Amateur community, how incumbent uses of the Amateur 5 cm band would be protected.

8. The Commission continues:

> *"Additionally, we believe, based on the comments, that sharing could be feasible, particularly if we limit appropriately the authorized power for unlicensed devices."*

9. And in Appendix A at section 15.409, the Commission proposes to add the following rule revision:

> *"(a) NII/SUPERNet devices will not deemed to cause harmful interference to licensed services provided the devices operate in accordance with the output power, out-of-band emissions limits and spectrum etiquette requirement of this subpart and provided the devices are located indoors or employ an outdoor antenna that is mounted no more that 15 meters above ground."*

10. It appears that the Commission itself has proposed only one form of interference protection to the Amateur service; A power limitation of 0.1 Watts of transmitter output power. Finally, the Commission states at 48:

> *"Nevertheless, we find merit in the concept of longer range community networks and seek comment on whether to permit such high power operation at up to 1 Watt of transmitter output power within the 5.725-5.875 GHz band."*

11. Before commenting on this proposed method of band sharing, we would like to illustrate just how adding the new unlicensed service to the existing 5 cm Amateur allocation affects incumbent operations. We will argue just one facet of Amateur 5 cm operations, "weak-signal". It must be clearly understood that there are many other uses and users of the Amateur 5 cm band, each of which will suffer similar forms of reduction of effectiveness from the proposed unlicensed NII/SUPERNet devices[2].

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[2] See comments filed by SCRRBA (The Southern California Repeater and Remote Base Association) to the original proposal. An attachment to their filing is a copy of the current Southern California 5 cm band plan. This plan shows the various existing uses of the Amateur 5 cm allocation and illustrates how the proposed upper NII/SUPERNet band segment will affect each of these uses.

12. The frequency of 5,760 MHz has long been established as the center of "weak-signal" activity throughout the United States as well as other countries worldwide[3]. Most of this type of activity occurs in the segment of 5,759.75-5,760.75 MHz, *and this segment falls within the proposed upper NII/SUPERNet band segment.* A substantial number of stations across the United States and around the world use this one-megahertz of spectrum for weak signal activities. These activities include line-of-site, beyond-the-horizon and earth-moon-earth communication. As the name weak-signal implies, we are looking to communicate using received signal levels equal to or below the natural noise floor.

13. Stations in this portion of the band currently use high power and/or high antenna gain to increase ERP to the levels required to allow for successful communications over challenging paths. Additionally, these stations use low noise temperature receiving pre-amplifiers, narrow bandwidths and generous amounts of filtering to prevent unwanted signal and noise sources from degrading system performance. These state-of-the-art stations represent a substantial investment in time and money to construct and operate with such advanced performance capabilities.

14. Hunting for weak signals in an environment with other unknown or unpredictable signal sources will make weak-signal communications more difficult, or perhaps impossible, depending upon the level of interference received from the new proposed unlicensed NII/SUPERNet equipment.

15. To compound this problem even further will be the effects of propagation of signals generated by the proposed NII/SUPERNet devices. Reflection of microwave signals by natural or man-made objects is well documented[4]. Society members routinely use bounced paths (reflections) or scatter paths to complete communication circuits on all microwave bands (up to and including 12 mm).

16. Another complicating factor is the enhancement of propagation through the lower atmosphere by phenomenon known as atmospheric ducting[5]. Again, Society members use atmospheric ducting routinely to accomplish their communications goals. In areas like southern California, this phenomenon can be active throughout the year but is most predominant in the spring and summer months. Other geographic areas of the Country can experience ducting throughout the year.

17. Society members have established and conducted voice-grade communications over 100 to 300 km paths using ERP levels similar to those proposed for the

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[3] An Amateur allocation exists at 5 cm in ITU regions 1, 2 and 3. CFR 47, 97.301

[4] It is no accident that radar systems primarily operate in the microwave frequency range. Radar systems operate throughout the UHF, SHF and EHF ranges to take advantage of the reflective properties of natural as well as man-made objects. If it were not for the reflective/scattering properties of natural and man-made objects, these systems could not operate.

[5] Again, this phenomena is well documented. The United States has conducted numerous studies on causes and subsequent uses for enhanced microwave propagation. Computer programs are now available which allow interested parties to predict and utilize atmospheric ducting.

NII/SUPERNet devices. This has been accomplished on all of the microwave bands ranging from 23 cm to 3 cm[6]. Based upon this experience, we believe that each NII/SUPERNet system installed and operated within the limits of our 5 cm band will appear to us at minimum as a large area of noise on our radio horizon just as the street lights of a urbanized area create a diffuse glow in the night sky. The amount of noise and area affected will be based upon the number and efficiency of available reflectors, the number of field terminals and their associated area of operation coupled with propagation characteristics.

18. What might seem like an obvious solution would be for the incumbent Amateur weak-signal activities to simply "change frequency" and move spectrally away from the sources of interference. The very nature of weak-signal hardware does not lend itself to easy changes in operating frequency. Local, national and worldwide band plans would have to be revised, and this would be contingent upon the availability of acceptable spectrum in each participating country. Local-oscillator systems and filter packages will need to be remanufactured at a financial cost to each station operator[7].

19. The point here is that if the proposed unlicensed NII/SUPERNet devices cause interference to incumbent Amateur users of the 5 cm band, like weak-signal, that spectrum occupied by the unlicensed device is effectively rendered useless to most all Amateur activities. As more devices or networks come on line, more of the Amateur spectrum will become unusable.

20. In its comments to the original petitions, SCRRBA argues this point for all of the incumbent users of the 5 cm Amateur band. We fully agree with the arguments put forth by SCRRBA in their previous filing.

21. Proponents of the proposed new service argue that there will be widespread application of the NII/SUPERNet devices[8]. This leaves little hope for Amateurs to retain any relatively quiet spectrum within the proposed NII/SUPERNet upper band segment.

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[6] Society members frequently communicated on 5 cm in the 50 km to 100 km range during the 1950s, 1960s and 1970s using inefficient technologies and relatively wide bandwidths. With the introduction of the "Gunnplexer" in the mid 1970s, routine communications on the 3 cm band (a band with very similar propagation characteristics to 5 cm) of over 100 km has been accomplished by many Amateurs all across the United States. In both of these examples, ERP levels virtually the same as those proposed for the NII/SUPERNet devices were used.

[7] We remind the reader that the Amateur Radio Rules specifically prohibit radio Amateurs from profiting from the use of their licenses. Amateurs provide all of their services to the public free of charge. Costs to Amateurs to accommodate changes in band allocations are born solely by the Amateurs themselves.

[8] See NPRM 96-193, paragraphs 13, 14 and 15, for example.

Conclusion

22. Through NPRM 96-193, the Commission has asked for comments regarding its proposed rules governing the creation and implementation of a new "part 15" band in the 5 GHz frequency range. Our comments, therefore, are aimed at the specific issue of sharing the proposed upper band segment ranging from 5.725 to 5.875 GHz.

23. The Amateur service successfully shares almost all of its operating bands with other services. The Amateur community universally has upheld its commitment to non-interference with its spectral neighbors. While we are disheartened by the thought of any additional unlicensed transmitters operating within the Amateur 5 cm band, the proposed part 15 rule change is most alarming.

24. The current part 15 rules with regard to harmful interference to Amateur stations read as follows:

> *"15.5 (b) Operation of an intentional, unintentional or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station..."*

25. To date, this section clearly protected the Amateur 5 cm allocation from interference caused by currently authorized part 15 devices operating within the band segment of 5.725 to 5.875 Ghz[9]. When originally created, the Commission wisely added the labeling requirement for part 15 devices which to clearly established a hierarchy under which interference issues could be resolved[10]. This gave the users of these devices, a non-technical general public, some understanding of the responsibility associated with owning and operating these devices

26. The Society is unaware of any instance where this rule section has been invoked to resolve an interference issue with any properly operating part 15 device principally due to the established part 15 rules. Radio Amateurs as a fraternity would prefer to exhaust all equitable solutions to such a problem before invoking the protections guaranteed in 15.5 (b). This protection is extremely important to Amateur radio operators because it clearly establishes priorities of communications within the Amateur allocations.

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[9] We note that Amateurs must accept interference from ISM devices operating on or about 5.8 Ghz. It is important for the reader to note that, from our experience, these ISM devices are few and far between, and there is no indication anywhere that a proliferation of ISM devices will occur like the potential for proliferation of the proposed NII/SUPERNet devices.

[10] 47 CFR, section 15.19 requires all part 15 devices to display a label which states "operation is subject to the condition that this device does not cause harmful interference" or "...(1) This device may not cause harmful interference...", depending on the type of device.

27. The new proposed rule section 15.409 quoted above removes such protection from the Amateur service. If an Amateur station receives interference from one of the new NII/SUPERNet devices *operating in accordance with Commission rules*, the Amateur station *must accept any and all interference generated by the new device*.

28. If and when this new NII/SUPERNet service is created under the existing part 15 rules, it will only be a matter of time before these devices begin to be utilized. **For this reason we must respectfully state that we are opposed to the wording of proposed section 15.409 as it will degrade the usefulness of the Amateur allocation at 5 cm, and most likely in time render it entirely useless.**

29. The proposal of limiting transmitter power to 0.1 Watts appears acceptable when coupled with the existing part 15 rules. Under the proposed no-fault interference rules, any useful power level will be harmful to Amateur operations. An omni-directional antenna meeting the proposed 15 meter rule with a gain of 10 or more dB produces an ERP of 1 or more Watts. There is no conceivable way that these stations will not cause harmful interference to existing Amateur operations, and the no-fault interference rule leaves Amateurs no choice but to in time vacate the affected spectrum.

30. The Commissions additional consideration of allowing 1 Watt output power transmitters operating into omnidirectional antennas spread throughout American cities will certainly end Amateur operations in the affected subband. **We again must respectfully state that we are opposed to this higher output power level as it will further degrade the usefulness of the Amateur allocation at 5 cm beyond what will occur at the currently proposed power level of 0.1 Watt.**

31. Finally, we must object to the wording of proposed section 15.409 because it is in conflict with the essence of the long established spirit of part 15 rules. As outlined above, it destroys a long-established hierarchy under which the users of part 15 devices had a clear understanding of the responsibilities associated with owning operating these devices.

32. The Society wishes to thank the Federal Communications Commission and staff for allowing us this opportunity to present our side of this complex issue. The Amateur community depends heavily on the Commission to protect our interests in these and related matters because the Amateur service is by design a non-commercial service. We therefore ask the Commission to help protect, maintain and insure the usefulness of the Amateur 5 cm allocation

For the membership,
Frank Kelly, President
San Bernardino Microwave Society